

20.

Migration of Insects (Other than Lepidoptera) Through Portachuelo Pass,
Rancho Grande, North-central Venezuela.¹

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[This is one of a series of papers resulting from the 45th, 46th and 47th Expeditions of the Department of Tropical Research of the New York Zoological Society, made during 1945, 1946 and 1948, under the direction of Dr. William Beebe, with headquarters at Rancho Grande in the National Park of Aragua, Venezuela. The expeditions were made possible through the generous cooperation of the National Government of Venezuela and of the Creole Petroleum Corporation.

[The characteristics of the research area are, in brief, as follows: Rancho Grande is located in north-central Venezuela (10° 21' N. Lat., 67° 41' W. Long.), 80 kilometers west of Caracas, at an elevation of 1,100 meters in the undisturbed montane rain forest which covers this part of the Caribbean range of the Andes. The migration flyway of Portachuelo Pass, which is also the water-shed between the Caribbean and Lake Valencia, is 200 meters from Rancho Grande. Adjacent ecological zones include seasonal forest, savanna, thorn woodland, cactus scrub, the fresh-water lake of Valencia and various marine littoral zones. The Rancho Grande area is generally subtropical, being uniformly cool and damp throughout the year because of the prevalence of the mountain cloudcap. The dry season extends from January into April. The average humidity during the expeditions, including parts of both wet and dry seasons, was 92.4%; the average temperature during the same period was 18° C.; the average annual rainfall over a five-year period was 174 cm. The flora is marked by an abundance of mosses, ferns and epiphytes of many kinds, as well as a few gigantic trees. For further details see Beebe & Crane, *Zoologica*, Vol. 32, No. 5, 1947. Unless otherwise stated, the specimens discussed in the present paper were taken in the montane cloud forest zone, within a radius of one kilometer of Rancho Grande.

[For an account of Portachuelo Pass, together with a general introduction to the groups of migrating insects and migrating factors, see "Insect Migration at Rancho Grande," by William Beebe, *Zoologica*, 1949, Vol. 34, No. 12, pp. 107-110. Papers dealing with specific groups are as follows: Papilionidae (Vol. 34, No. 14, pp. 119-126); Danaidae, Ithomiidae, Acraeidae and Heliconidae (Vol. 35, No. 3, pp. 57-68); Pieridae (Vol. 35, No. 16, pp. 189-196); Nymphalidae, Brassolidae, Morphidae, Libytheidae, Satyridae, Riodinidae, Lycaenidae and Hesperidae (Vol. 36, No. 1, pp. 1-16); Day-flying Moths (Vol. 36, No. 19, pp. 243-254).

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INTRODUCTION

The present paper is concerned with the emigration through Portachuelo Pass of members of the following Orders of insects: Orthoptera, Dermaptera, Plecoptera, Corrodentia, Embioptera, Isoptera, Odonata, Heteroptera, Homoptera, Neuroptera, Coleoptera, Diptera and Hymenoptera. Preceding papers have dwelt with the families of Rhopalocera and day-flying Heterocera.

Relatively less attention in collecting and observation was paid to the various groups in the present paper, so they are discussed in much less detail than those in earlier publications, and comparatively few of the species have been identified. This mass emigration from north to south through a narrow pass appears to be a constant annual phenomenon, and as such may be studied by future entomologists. So I have retained all catalogue numbers and collection dates and data. In many cases I have added the purely popular descriptive names which I used in my field notes. The value of these lies only in the suggested, diagnostic characters visible in field and sight recognition.

We have no explanation for the intensive and continued emigration of these many orders, many of whose members have not before been classed as migrants. Of one thing we are certain: that in the course of three years of intermittent observation we have no record of any apparent return, of any passing of individuals in the opposite direction—from south to north.

ORTHOPTERA.

Six families of this order were represented among Portachuelo Pass migrants.

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BLATTIDAE.

Only once did cockroaches appear in daylight at the pass and even this was hardly to be expected of these essentially nocturnal insects. July 25, 1948, was a sunny morning, with migration, for some unknown reason, at a low ebb. At ten o'clock I was about to give up observation when a flurry of large brown insects appeared, fluttering slowly up the gorge into full sunlight and on down the south slope.

I caught one and found it a three-inch *Blaberus giganteus* (Linn.) (481571), characterized by a general pale brownness, with a large dark spot on the thorax. Thirty would be a conservative estimate for the number in the flock. There were no stragglers, and I saw no cockroach of any kind in any other daylight migration. This species ranges from Mexico to northern South America.

PHASMIDAE.

The occurrence of stick insects as migrants parallels that of the giant blattid. June 5, 1948, was cool and rainy and very few insects attempted to scale the pass. In early afternoon there was only a scattering of small butterflies and day-flying moths and a half dozen pompilids. At two P.M. there appeared four fluttering insects, two of which I caught and found to be dull brown phasmids, both of the same species. (481572, 481572A).

MANTIDAE.

There are only two records of mantids as migrants through Portachuelo Pass. The first individual, taken on April 10, 1946, was a small green-winged species (46337); the second, on June 17, 1948, was black-winged with conspicuously dotted legs (481573). The first was solitary, but six mantids, probably of the same species, passed at the time that No. 481573 was captured.

LOCUSTIDAE.

Although locusts are symbolic of devastating hordes of migrants in many parts of the world, yet these short-horned grasshoppers were almost absent from Portachuelo Pass.

On August 31, 1946, a flock of at least three hundred small grasshoppers flew south through the Pass (461100), their only appearance as migrants. Singly, they were not uncommon around Rancho Grande, usually clinging to an upright blade of grass in a most curious position, the hind legs held akimbo, on a plane horizontal with the body. The abdomen ended in a rounded lump, almost indistinguishable superficially from the head at the opposite end of the insect.

The only other representative of the family Locustidae was the great, scarlet-winged *Tropidacris dux*, whose wings spread from eight to nine inches. In 1946, although I made no definite date records, I observed this species occasionally migrating singly or in twos and threes. In 1948 single ones were now and then seen. On June 4, 16 appeared,

some of them resting for a time on the trunks of cecropia trees. On the sixth 23 came through, and two more on June 7. The last one seen was on June 26 (481399).

TETTIGONIIDAE.

A large green katydid, with broad, three-inch wings, on April 17, 1948, flew through the pass in the company of at least eight others. I took one individual, (481574).

A brilliantly colored grasshopper of considerable size, it proved to be not only a voracious carnivore, but an occasional migrant. This was *Monchea pretiosa*, conspicuously colored violet, black and gold. The following notes were made at the pass; 1946—June 10 (1 taken; 13 others seen). 1948—July 15 (1 taken, 481575; six others seen).

A most striking tropical grasshopper migrant had its wings reticulated with green and buff, and elaborate and complex series of curved spines on head, thorax and legs. A specimen was taken May 26, 1948 (48642). Ten days later, on June 5, nine of these insects came fluttering through the pass, just out of reach, but clearly distinct in all general details.

TRIDACTYLIDAE.

These little harlequin grasshoppers, *Rhipipteryx*, are common over most of northern South America. Their usual method of progress is by a sudden, terrific leap from their specialized hind legs, ending in a long, smooth, scaling glide. I have never been certain of seeing sustained flight. Yet it is no mean member of the migrating insects in Portachuelo Pass. It was observed in small numbers on many days, mingling and passing with the flights of other small insects.

The following gives definite data for three days on the three years of our observation: 1945—March 30 (1 taken, 4541; 20 to 30 others seen). 1946—May 4 (2 taken, 46413; 848 counted in fifteen minutes. The insects flew low, looking like small chrysomelids, passing all day). 1948—June 30 (1 taken, 481004; more than 200 counted).

DERMAPTERA.

Earwigs were unusual migrants, with a curious chronological distribution, as far as our observations went. In the year 1946 four species were taken, singly, on separate dates, in full sunlight. In 1948 only a single species was observed, but on five separate occasions. This earwig was small, dark-brown, with the covered portions of the flight wings white. All appeared singly except on May 20, when several dozen of the same species were seen on leaves in the pass or flying southward. No identifications have been attempted.

The data are as follows: 1946—March 15 (1 taken, 461233), 20 (1 taken, 461234), 25 (1 taken, 461235); May 1 (1 taken, 461236). 1948—All one species; April 26 (1 taken, 48389); May 20 (1 taken, 48539; several dozen seen); June 9 (1 taken, 48753); July 5 (1 taken, 481100A), 25 (1 taken, 481380).

PLECOPTERA.

Stone flies were observed a number of times passing through Portachuelo Pass. On four occasions they were taken singly, but on April 28, 1948, twenty-seven were counted in addition to the individual netted. These were weak flyers, resembling termites in motion, or in general appearance like small wasps with banded wings. In several individuals a mass of small black eggs depended from the abdomen. Record: 1946—May 4 (1 taken, 461237). 1948—April 28 (1 taken, 48429; 27 others seen); May 21 (1, taken, 48556), 25 (1 taken, 48590); July 8 (1 taken, 481576).

CORRODENTIA.

A single specimen of psocid was taken with other insects flying south through the pass. This was on April 23, 1948, (48426).

EMBIOPTERA.

This small tropical order was represented among the migrants by a single individual. When taken in the net it was supposed to be a termite, the resemblance being in general flight, size and type of wings. No. 48672 was taken on May 29, 1948.

ISOPTERA.

After heavy rains, at the right season, termites swarmed in the vicinity of Rancho Grande. These swarms would rise into the air and become diffused, attacks by birds being apparent in all directions from the nest.

Twice, at least, swarms of these insects behaved like true migrants. On July 5, 1948, great numbers appeared far down the north gorge and worked steadily upward to the pass and on through, down the southern slope. They had hard going, for there was a fairly strong breeze against them, which drove many back again and again. Several were taken (481094).

Eleven days later, the same phenomenon was repeated, this time the flight occurring in still weather, but as directly from north to south as the first flight. This was a smaller species (481577).

ODONATA.

Dragonflies were not uncommon at the pass in the role of predators on the passing migrants, sharing this with robberflies, swallows, swifts and bats. On several occasions, however, when general migration was at rather a low ebb, I saw these insects passing in numbers. Of these I took nine individuals of five species, two of which were damselflies.

NOTE: In the records that follow, the word "taken" is often omitted from the figures in parentheses. In such cases, the first figure refers to the number of specimens taken and the figures following the comma are the catalog number.

AESCHNIDAE.

Large Transparent-winged Red-bodied Dragonfly; 1948—July 11 (1 taken, 481145; 24 seen).

Large Amber-winged Dragonfly; 1948—June 9 (1 taken, 48751; 17 passed, one of which seized a robberfly in full flight); June 24 (1 taken, 48899); July 16 (1 taken, 481578).

LIBELLULIDAE.

Four-banded Dragonfly; 1948—June 6 (1 taken, 48726); July 21 (1 taken, 481276; 18 seen).

AGRIONIDAE.

Clear-winged Damselfly; 1948—June 6 (2 taken, 48724, 48725).

Amber-tipped Damselfly; 1948—June 6 (2 taken, 48725A, 48726; 28 seen).

HETEROPTERA.

In the case of individuals of the less abundant orders of insects I have made no attempt at specific identification. All are furnished with distinguishing labels and catalogue numbers, and can be identified at any time. Five families of this order are represented, comprising eleven species.

PENTATOMIDAE.

Shield or Stink bugs were rarely seen on migration, although I must have missed many. Four species were taken, all but one singly. All were of good size, from 15 to 20 mm.

Glossy Black; 1948—May 29 (1, 48674).

Red-spotted Green; 1948—May 31 (1, 48682; 4 others seen).

Glossy Green; 1946—June 29 (1, 46701).

Green-winged Brown; 1948—July 24 (1, 481368).

COREIDAE.

Three species are represented by two to six individuals taken, and many others seen.

Amber-spotted; 1948—May 24 (1, 48615); June 18 (1, 48840A), 22 (1, 48840; many seen flying past), 24 (1, 48908; 12 seen); July 13 (2, 481157).

Red-eyed Black; 1948—June 6 (2, 48711, 48712).

Leaf-legged; 1948—March 27 (1, 481580); June 6 (1, 48720; 16 flying with small butterflies).

PYRRHOCORIDAE.

Ceratocapsus balloui Knight.

Cotton Stainers represent this family. They were not uncommon in the Valencia district, and we noted them on migration through Portachuelo Pass on four different days. 1948—June 7 (1, 48761), 24 (1, 48909); July 5 (1, 481095), 16 (1, 481218; 38 seen passing).

REDUVIIDAE.

Two species of this family were noted on two occasions. 1948—April 18 (1, 481581);

June 7 (1, 48768; 15 other individuals passing in loose flock).

MIRIDAE.

Three individuals were taken of one species.

Orange-thorax Black; 1948—July 8 (1, 481123; 22 others flew past or rested on leaves before taking off), 13 (2, 481157B and C).

HOMOPTERA.

Six families belonging to this order were taken, comprising about twenty-five species.

CICADIDAE.

On six separate occasions cicadas of large size were seen in the pass, or flying through, but none were taken.

On July 5, 1948, I took a small (20 mm.) green cicada (481096), and saw 18 others within a few minutes. This was probably *Taphura* sp.

MEMBRACIDAE.

Five species were among the migrants, three taken singly, two accompanied by small numbers.

Rugose Brown; 1948—April 29 (1, 48431; 11 seen).

Three-pronged; 1948—May 20 (1, 48532, taken in flight; 8 others seen).

Cream-fronted Giant-keel; 1948—May 26 (1, 48633; four seen).

Black-spotted Keeled; 1948—May 24 (1, 48614).

Large, Glossy-black; 1948—May 1 (1, 481582).

FULGORIDAE.

Among the migrants were five species. Only one of these showed the scarlet flash coloring of many tropical species.

Three-spined Snouted; 1946—March 27 (1, 46295; six others were seen); May 23 (1).

Half-black-and-clear-wing; 1948—May 24 (1, 48612); July 5 (1, 481097; 16 others on leaves and passing).

Half-brown-and-clear-wing; 1948—March 15 (1).

Small Snouted; 1948—May 24 (1, 48613).

Small Clearwing; 1946—June 13 (1, 46571).

CERCOPIDAE.

Five species of froghoppers were recorded as migrants. In the case of three of these, individuals were seen to the number of several hundred.

Yellow-banded Brown; 1948—July 3 (1, 481035; 40 odd seen).

Yellow-banded Black; 1948—June 21 (1, 48868; several hundred flying about, slowly southward), 24 (1, 48910; 32 seen).

Scarlet-banded Black; 1948 July 8 (1, 481127; we counted more than four hundred), 15 (1, 481180).

Large Scarlet-and-black; 1948—July 13

(1, 481158), 14 (1), 26 (1, 481390; eight seen).

Small Amber; 1948—June 21 (1, 48867; many on leaves), July 4 (1, 481057).

CICADELLIDAE.

Large Ivorywing; 1948—July 2 (1, 481017; 16 of these conspicuous insects counted in company with the one taken).

Medium Brown; 1948—June 23 (1, 48894; 4 others caught in cobwebs).

Greenwing; 1948—June 24 (1, 48907).

Clear-tipped Black; 1948—July 2 (1, 481016; six on leaves and flying).

Three Minute Species; 1948—July 22 (1, 481363), 24 (1, 481381), 25 (1, 481383).

ALEYRODIDAE.

On April 24, 1948, a small cloud of these insects passed, of which I caught one (481583). All trailed waxy threads.

NEUROPTERA.

CORYDALIDAE. Dobsonflies.

Dobsonflies were seen migrating on several occasions. Their size and their slow, fluttering flight made sight identification easy. On May 14 a flurry of about fourteen of the pale yellow-winged species was driven down to the low shrubs at the pass by a strong wind. Some took shelter among the foliage, but all, in time, seemed able to make their way through the branches and down the farther slope.

Large Brown-winged (length 80 mm.); 1948—June 15 (1, 48807; 3 others seen).

Pale Yellow-winged (length 48 mm.); 1946—May 5 (1, 46421). 1948—May 14 (1, 48524A; 14 others seen).

MANTISPIDAE. Mantislike Neuroptera.

Only by examining the results of net sweepings on days of abundant nekton migrants could the presence of these delicate little insects be proved. They were detected on several days. 1948—June 29 (1, 481397); July 14 (4 taken at once, 481493).

MYRMELEONIDAE. Ant-lions.

Only 2 individuals were seen or taken at the pass. Both were in flight in full sunlight in company with such unlike fellow migrants as pompilids and day-flying moths. 1948—May 26 (1, 48600), 30 (1, 48676).

COLEOPTERA.

Seventeen families of beetles were taken as very evident migrants through the pass. Some of these appeared singly, but in several cases they vied in sheer numbers with the other most abundant migrants, passing steadily, day after day, week after week. Comparatively few Coleoptera have been specifically identified, but catalogue numbers and dates have been provided, and for hints of diagnostic field characters we have added our tentative field names.

CARABIDAE.

Four species represent this family among the migrants. The *Calosoma* came occasionally to our electric lights.

Calosoma sp. 1948—June 30 (2, 481000, 481003; 12 others on leaves and flying); July 7 (1).

near *Euproctus*; 1948—March 22 (1, 481588).

near *Carabus* (1st species); 1946—April 15 (1, 46332).

near *Carabus* (2nd species); 1946—July 12 (1, 46769).

STAPHYLINIDAE.

Eight species of these beetles were recorded as migrants. All, with one notable exception, were represented by only one or two individuals. What I called the Iridescent Staphylinid, conspicuous in glowing copper and emerald, sometimes came through the pass in scores or even hundreds.

Iridescent Staphylinid; 1946—April 26 (1), 28 (1; 12 seen). 1948—May 24 (1); June 6 (2, 48708, 48710), 15 (1, 48801; 52 seen), 27 (1, 48969; 24 counted), 30 (1, 481005; 6 seen); July 2 (2, 481019, 481020), 4 (1; 6 seen), 15 (2, 481201; 481202; 15 seen), 16 (2, 481231, 481232; several hundred seen), 21 (1, 481288; 48 seen).

Amber and Green; *Paederes culumbrinus*; 1945—June 12 (1, 45310). 1946—April 27 (2, 46398). This record is based on three beetles resting on leaves at the summit of the pass, one of which took off to the south. The species appears, however, to be essentially nocturnal, as it thronged our Rancho Grande rooms at night, from April 16 to 28. Incidentally, its touch often caused a severe skin eruption.

Golden-buff; 1948—July 25 (1, 481384).

Copper-thorax; 1946—June 26 (1, 46674).

Green-punctate-thorax; 1946—June 26 (1, 46673).

Bronze-thorax; 1946—June 26 (1, 46671). 1948—July 4 (1, 481059).

Square-thorax; 1948—July 5 (1, 481059).

Rugose Brown; 1946—March 27 (1, 46298). 1948—July 21 (1, 481322; resembled bee in flight).

LYCIDAE.

About eighteen species of this family appeared as migrants at the pass. Only four were seen in numbers, but the majority of the other forms were so small and inconspicuous that there may have been many more than came to our attention. The calopterons resembled small moths and beetles in flight.

Calopteron sp. Buff-banded Black; 1948—April 28 (1, 48425; 18 seen); June 9 (1, 48779); July 14 (1, 481169; 8 others seen and 2 pairs mating in flight), 15 (1, 481194), 17 (1, 481236), 21 (2, 481283, 481284; 16 flying like moths), 23 (2, 481341, 481342; 12 seen).

Calopteron sp. Two-banded Orange-and-

black; 1948—June 7 (1, 48767; 15 seen), 28 (1, 481412).

Lycostomus sp. Half-blue-half-orange; 1948—April 27 (1, 48418; 16 seen), 28 (2, 48424; 22 seen); July 15 (2, 481192, 481193; 42 counted on leaves and flying).

Thirteen Small, Unnamed Lycids; 1946—September 8 (461164). 1948—April 27 (48417). May 24 (48610). June 24 (48905). June 29 (48988). June 30 (481006). July 2 (481013). July 8 (481112). July 9 (481134). July 13 (481157). July 15 (481195). June 10 (481413). June 24 (481414).

HISTERIDAE.

Hololepta sp. Recorded only once, on June 22, but the leaves were covered with many of these little beetles. Four flew south as I watched. 1948—June 22 (1, 48889).

LAMPYRIDAE; Fireflies.

Ten species of fireflies defied the sun's glare in migration, and were taken passing southward in full daylight through Portachuelo Pass.

Large Wavy-buff Black; 1948—July 2 (1, 481015).

Two-spotted Thorax; 1948—May 24 (1, 481590).

Pale-brown; *Aspidosoma* sp. 1948—April 26 (1, 481591).

Black-spotted Buff; 1948—July 9 (1, 481129).

Pale-edged; 1948—May 2 (1, 48440A), 24 (2, 48609); June 10 (1, 48759; 18 seen); July 5 (1, 481093), 17 (2, 481235; 4 seen).

Single-vented Feather-antennae; (two species); 1946—March 22 (1, 461088). 1948—July 26 (1, 481389).

Double-vented Feather-antennae; (two species); 1948—March 15 (1, 481592); April 16 (1, 48370); July 13 (1, 481157).

PHENGODIDAE.

Three species of Feather-antennae Beetles were taken.

Large; 1948—April 29 (1, 48433), May 6 (1, 481585), 14 (1, 481586).

Medium; 1948—May 4 (1, 48485).

Small; 1946—March 19 (1, 46271).

CANTHARIDAE.

A single striking species of this family appeared as a migrant, making up in number of individuals what was lacking in additional species. The elytra are half yellowish-brown and half dark blue. When annoyed the beetle rolls itself into a tight ball with the wings protruding, making an excellent imitation of a wasp in the act of stinging. 1945—May 8 (1). 1946—July 17 (1, 46788; a steady stream of more than 800); September 5 (235 seen). 1948—June 6 (2, 48705), 16 (2, 48809), July 3 (1, 481042; many passing), 6 (1; 6 seen), 8 (3, 481126; 27 counted), 13 (1, 481161), 14 (1), 16 (1), 21 (1, 481321; 78 seen).

MELOIDAE.

Two small, brown oilbeetles were the only ones taken or seen on migration; 1946—March 8 (1, 461086); May 5 (1, 461085).

ELATERIDAE.

As migrants we recorded fourteen species of elaters. Eight of these were taken singly; the remainder were accompanied by a fewer or greater number of individuals, flying past at the time. In flight these beetles were sometimes confused momentarily with wasps of corresponding size, but this only at a distance. A few have been identified. I have applied to all the descriptive names I used in my field journals.

Large Striped Elater: *Semiotus imperialis* Guérin; 1948—April 20 (1), 27 (1; 5 seen), 28 (1, 9 seen), 29 (1, 48432); May 11 (1; 15 seen), 23 (1, 48580); June 30 (1; 6 seen), July 6 (1; 7 seen).

Large Five-spotted; *Semiotus insignis* Caud.; 1946—April 4 (1, 46419). 1948—July 10 (1, 48781; 8 seen), 28 (1, 48980; 12 flying out of reach).

Medium Many-striped; *Semiotus* sp.; 1946—May 11 (1, 46450; 15 seen). 1948—June 9 (1, 48752), 22 (1, 48888; 16 seen in 10 minutes); July 10 (1, 481140; 9 counted), 15 (1, 481196), 21 (2, 481281, 481282; 10 flying singly).

Half-orange-and black; *Semiotus caracasanus* Caud.; 1948—July 2 (1, 481014; 4 seen), 18 (1, 481245).

Scarlet-thorax; *Semiotus* sp.; 1948—May 27 (1, 48637; 4 seen); July 15 (1, 481197), 23 (23 seen).

Common Eyed Elater; *Pyrophorus noctilucus* Linn.; 1948—April 30 (1, 48436).

Square-thorax Brown; *Chalcolepis luzotii* Caud.; 1948—April 25 (1, 481584).

Black-dotted Red; *Coroderus* sp.; 1948—June 15 (1, 48800).

Small, White-dotted Black; 1946—July 6 (1, 46742), 12 (1, 144 seen on leaves and flying).

Small, slender Brown; 1948—July 3 (1, 481044).

Three Minute Species (ca. 3 mm.); 1948—July 22 (3 individuals of 3 species; 481364 A, B and C).

Small, Black-tipped Brown; 1948—May 21 (1, 48562).

BUPRESTIDAE.

A single large, green, buprestid was taken going south through the pass. 1948—August 10 (1, 481589). A second, minute (3 mm.) bronze-wing was flying with other small insects on September 8, 1946 (461169).

EROTYLIDAE.

Four species of erotylids were among the migrants. All were taken one at a time, and in no case more than four of one species. All were mingled with other forms flying south through the pass.

Black-speckled Brown; 1946—March 16

(1, 461089). 1948—May 15 (1, 481410); July 10 (1, 481150), 26 (1, 481396).

Dull-brown; 1948—June 16 (1, 48812); July 23 (1, 481338).

Glossy-brown; 1948—July 3 (1, 481048), 21 (1, 481287).

Black-banded Brown; 1948—July 16 (1, 481230).

TENEBRIONIDAE.

Two unidentified species represent this family among the migrants.

Bronze-winged; 1948—May 24 (1, 48618).

Purple-ridged; 1948—June 9 (1, 48778).

SCARABAEIDAE.

Daylight migrating scarabs number twenty species, ranging from 10 mm. melolonthas to giant hercules beetles. Almost all the forms appearing in diurnal migration also came to our lights, at night, on Rancho Grande roof. As we have made few identifications, I have used the tentative popular names which I used in my field journals.

Dung Beetles; Three specimens of three species were taken singly. I expected larger numbers, judging by the usually diurnal habits of these beetles when reacting to food.

Horned Scarab (two small species); 1946—May 25 (1, 46513). 1948—June 18 (1, 48839; 16 in a few minutes); July 4 (1).

Macrodactylus, Rose Beetles; Seen migrating on seven occasions, and almost always in numbers; 1946—June 7 (1, 46548; 12 others seen). 1948—May 24 (1, 48605); June 6 (4, 48699; 68 counted passing); July 4 (1), 5 (1, 481092), 15 (1, 481198; 43 seen), 18 (1).

Dynastids, Hercules Beetles; On four occasions we saw the great Hercules Beetles, *Dynastes hercules* (Linn.), flying through the pass. On July 4, three followed each other closely. One circled several times before heading south. I took only one, 1948—May 28 (1, 48674). These insects were more commonly seen at night at our electric lights.

Small (10-15 mm.) Junebugs or Melolonthinae. *Cyclocephala* sp., Punctated Brown Beetle; This was the most abundant species of beetle seen on migration. It was present on almost every day of observation, either singly or with 10 to 40 in sight at once. From May 24 to the last of July, a steady stream passed on most days. On June 20 and July 9 and 22 there were especially large eruptions, when thousands came over en masse. Thousands could have been taken. They often got into our nets by mistake when we were sweeping for other rarer insects. I list only a few of those taken. 1946—May 7 (2, 46547, 46548). 1948—May 24 (1, 48603); June 9 (1, 48755), 15 (1, 48805); July 4 (2, 481064, 481065).

Small Hairy Beetle; These were abundant as daytime migrants, but many thousands came, night after night, to our lights. 1946—April 15 (46336), 16 (1), 27 (1, 46399; dozens passed all day). 1948—June 29 (2, 48992; hundreds day after day).

Cyclocephala, two species; 1946—April 16 (1). 1948—June 14 (1, 48793; fifty plus seen).

Three very small melolonthids; 1948—June 29 (1, 48995). 1948—July 26 (1, 481351). 1948—July 25 (1, 481385).

Large (22-27 mm.) Junebugs or Melolonthinae.

Seal-brown *Cetonia*; *Gymnetis* sp.; 1948—August 15 (1, 481587).

Iridescent Green; *Platycoelia* sp.; 1946—April 17 (1). 1948—April 26 (1); July 20 (1, 481261).

Black-thorax Iridescent Brown; *Chlorata* sp.; 1946—May 21 (1, 461087).

Bronze-thorax Iridescent; 1948—June 15 (1, 48797; 4 seen).

Black-mottled Pelidnota; *Cyclocephala mafafa* Burm.; 1946—April 26 (1); May 5 (1), 6 (1, 46440). 1948—June 22 (1, 48837).

Black-spotted Pelidnota; *Ancognatha humeralis* Burm.; These were common also at night, at our lights. 1946—March 25 (1); August 31 (1, 46998). 1948—June 16 (1, 48814); July 22 (1, 481326).

Black Junebug; 1946—April 27 (1, 46400; hundreds passing in dense swarm).

Iridescent Copper; *Macraspis chalcona* Burm.; 1946—April 20 (1). 1948—June 7 (1, 48750; 22 counted in one hour); July 22 (1).

Hairy Iridescent Copper; 1948—July 20 (1).

CERAMBYCIDAE.

Twenty species of longicorns were found to be migrants through Portachuelo Pass. None were abundant, but a few occurred in considerable numbers. A few, in actual size and weight, were second only to the rhinoceros beetle; two were strongly perfumed and others produced a varied assortment of squeaks. Certain ones bore, especially in flight, a striking resemblance to wasps and flies. I append some of my diagnostic field names.

I am indebted to Henry Fleming for most of the scientific names of this family.

Acrocinus longimanus Linn. Long-armed; 1946—April 1 (1, 46350); June 1 (1). 1948—Seen flying through on four occasions.

Adesmus griseus Auriv. White-frosted Ivory; 1948—June 9 (1, 48776), 24 (1, 48901); July 8 (1, 481120), 26 (1, 481395).

Brasilianus plicatus Olivier. Brown-wing; 1948—June 10 (1, 48782).

Callichroma vittata Fabr. Perfumed Emerald; 1948—June 17 (1, 48826; 6 others seen); July 4 (1, 481062); On the wing and in the net this was mistaken for a wasp, due to the nervous, jerky movements, long, quivering antennae and the greenish wing sheen. The pinned insect shows no hint of this resemblance.

Cyllene cayennensis L. & G., Wasplike; 1948—May 5 (1, 48492).

Eburadacrys callixantha Bates. Six Ivory-spot; 1948—May 24 (1, 48619).

Hippopsis assimilis Breuning. Thread-

horned; 1948—June 24 (1, 48906; Mistaken for a wasp, only when in the hand were the elongate, threadlike antennae visible); July 3 (1, 481046).

Hippopsis sp. nov. Buff-striped Dwarf; 1948—May 24 (1, 48611).

Jamesia papulenta Thomson, Brown Death-feigning; 1946—April 11 (1, 46522).

Listroptera aterrima Germar, Fly-like; 1948—July 15 (1, 481199; on the wing almost impossible to tell from a small black fly).

Myzomorphus quadrimaculatus Gor. Semi-elytra; 1948—July 6 (1, 481078), 16 (1, 481221).

Parandra glabra (Degeer). Small Brown Prionid; 1948—May 25 (1, 48594); June 8 (1, 48775, a not uncommon migrant); July 8 (1, 481127), 9 (2, 481138).

Psolidognathus sallei Thomson. Giant, Green Crook-jaw; 1946—April 16 (1, 461098). 1948—July 16 (2 at pass, 3 at Rancho Grande Bridge, all flying south). Seen several times migrating in 1948.

Pteridotelus laticornis White. Gray Death-feigning; 1946—August 2 (1, 46882). 1948—May 25 (1, 48596); June 10 (1, 48758).

Steirastoma melanogenys White. Thorn-thorax; 1948—May 24 (1, 48616).

Stenodontes spinibarbis (Linn.). Large-jawed Prionid; 1948—May 25 (11); June 13 (one taken with 24 ripe eggs, 6.5 by 2.5 mm.), 16 (1, 48813; 13 others seen); July 8 (1), 9 (1, 481138).

Taeniotes scalaris Fabr. Long-horned Ladder; 1946—May 30 (1, 46522).

Titanus mundus White. 1948—June 16 (1, 48813).

Trachyderes polita Bates. White-banded; 1946—April 30 (1, 46410).

CHRYSOMELIDAE.

As might be expected, flower beetles were present in great numbers among the migrants. Upwards of fifty species were taken, some singly, others in small lots and one or two in very great numbers. This was especially true of *Diabrotica quindecimpunctata* Ger. On almost every day of migration, these little black-spotted beetles passed, throughout the hours of daylight, either one by one or in more or less numerous swarms. Their total number was beyond credible computation. The abdomens of many were swollen with eggs.

Diabrotica quindecimpunctata Ger. I list only five of the many taken, and make no attempt to give even approximate count of the vast numbers. 1946—March 16 (1, 461097). 1948—May 1 (1, 48440); June 18 (2, 48837), 24 (1, 481596); July 8 (1, 481127). In life these beetles are rather brilliant; thorax chrysophrase green, elytra yellow ochre, which quickly fade after death.

No attempt has been made at identification of the remaining species. This will be the labor of some chrysomelid specialist. I can give only catalogue numbers and dates. It

must suffice to say that the well-known genera *Lema*, *Lachica*, *Haltica*, *Doryphora*, *Batanota*, *Coptocycla* and *Oedionyches* were all represented.

The following unidentified species of chrysomelids are given in chronological order accompanied by their respective catalogue numbers.

1946—March 16 (461094); March 16 (461095); March 18 (46267, 46267A); March 25 (461090); March 27 (461093); March 30 (46312); April 17 (46339); April 18 (461096); April 26 (461092); April 29 (461091); May 23 (46491); July 18 (46800).

1948—March 16 (481594); April 17 (481593); April 18 (481595); April 30 (48435); May 13 (48521); May 21 (48561); May 25 (48597); May 25 (48598); May 24 (48604); May 24 (48606); May 24 (48607); May 24 (48608); May 27 (48640); May 29 (48670); May 29 (48675); May 30 (48677); May 30 (48678); May 30 (48680); June 7 (48770); June 7 (48774); June 9 (48777); June 11 (48786); June 11 (48787); June 12 (48790); June 17 (48829); June 18 (48838); June 19 (48854); June 19 (48855); June 21 (48866); June 22 (48878); June 24 (48902); June 24 (48903); June 24 (48904); June 29 (48986); June 29 (48987); June 29 (48994); June 30 (481008); July 8 (481127); July 10 (481149); July 17 (481240); July 17 (481241); July 20 (481262); July 20 (481263); July 21 (481286); July 21 (481289); July 22 (481328); July 27 (481398); July 15 (481409); July 7 (481411).

BRENTIDAE.

Three species of these beetles were taken at Portachuelo Pass. On twelve days on which brentids were captured, only five appeared singly, so their status as migrants is undoubted. Twice, at a distance, I mistook them for wasps, but nearby there was no mistaking their identity.

Large (27 mm.) Orange-banded; 1946—March 13 (2, male and female, 461083, 461084; 12 seen); April 10 (1). 1948—June 22 (1, 48873; 13 seen); July 20 (1, 481334), 22 (1; 35 seen), 23 (1, 481333; 34 counted).

Small, Orange-dotted; 1948—July 13 (1, 481162).

Red-lined Black; 1946—March 26 (1, 46293; 7 seen). 1948—April 16 (1); May 27 (1, 48639; 4 seen); July 3 (1, 481043), 23 (1, 481339; 7 counted).

CURCULIONIDAE.

More than forty species of weevils took part in the migration. Identification on the wing was practically impossible, so few notes on specimens other than those taken could be made with any certainty. No attempt has been made at scientific identification, but I have added my diagnostic field names. These insects varied in size from 2 to 25 mm. The majority were of such small size and swift flight that it was impossible to distinguish even their family on the wing.

In one sweep of the net we took as many as five species and 13 individual weevils. All the weevils listed were taken in 1948.

Lichen-covered; April 15 (48369).

Hump-backed; May 20 (48535).

Large, Yellow-powdered; May 21 (48557).

Buff-and-brown Rugose; May 21 (48558).

Two-lined Shining; May 21 (48559).

Brown Pygmy; May 21 (48560).

Sage-green Pitted; May 21 (48561).

Black-tipped Pygmy; May 21 (48562).

May 25 (48590).

Large Amber-and-black Beaded; May 25 (48595).

Large Black-beaded; May 24 (48601).

Large-footed Black; May 24 (48602).

Black Rough; May 27 (48641).

Pale-striped; June 6 (48699).

June 6 (48707).

Rugged Brown; June 10 (48758).

High-rumped; June 6 (48773).

Mosaic; June 15 (48798); June 16 (48810); June 21 (48964); June 26 (481285).

Brown-and-buff; June 16 (48811).

June 22 (48890).

Black-and-white; July 5 (481091).

Brown-and-black; July 7 (481107).

Black; July 10 (481142).

July 13 (481157).

Pearly; July 13 (481159).

White-flanked; July 13 (481160).

Yellow-and-black; July 13 (481161).

Sequin; July 15 (481200).

Rugose Checkered; July 15 (481203).

Large White-checkered; July 17 (481239).

Wood-brown; July 19 (481250).

Greenish-white; July 19 (481251).

Pebbled; July 20 (481264).

Sepia; July 21 (481285).

July 24 (481367).

July 25 (481382).

Red-spot; July 27 (481422).

DIPTERA.

Owing to the limitation of daylight hours and of sheer physical endurance throughout the weeks of studying migration at Portachuelo Pass, we naturally devoted more attention to the larger, more perceptible forms of insects. This resulted in the relative neglect of such small sized groups as Diptera.

The result of casual collecting was the recording of 34 species of flies, belonging to 17 families, all undoubted migrants. The residual richness of others which would have rewarded more intensive collecting of this Order is indicated by two notes.

On July 24, when there was a steady stream of passing nekton migrants of small size, several sweeps of a net captured a mass of insects which, at the time, I labelled as "small flies, mosquitoes and gnats." Part of these ultimately resolved into 13 species of 9 families of Diptera. On the very next day, July 25, a corresponding method of collecting netted 4 families of craneflies, of 5 species, two of which were new. On May 29, a *Bibio*, No. 48671, taken, was accompanied

by a veritable mist of others, slowly drifting through the pass. As in other orders the total number of fly migrants must have been legion.

My thanks go to Dr. C. H. Curran for identifications.

ASILIDAE.

Lastaurus anthracmus O.S.; 1948—June 7 (2, 48764).

BIBIONIDAE.

Bibio sp.; 1948—May 29 (1, 48671; cloud of others passing).

Plecia confusa Loew; 1948—July 21 (1, 481318).

Plecia sp.; 1948—July 21 (1, 481317).

CULICIDAE.

Culex sp.; 1948—July 24 (2, 481354, 481355).

Mansonia sp.; 1948—July 24 (1, 481358).

DOLICHOPIDAE.

Condylotalum dimidiatus Loew; 1948—June 26 (1, 48963; hundreds passing, 26 taken in one sweep of the net).

DROSOPHILIDAE.

Drosophila sp.; 1948—July 24 (4, 481345, 481346, 481349, 481359).

LAUXANIIDAE.

Pseudocaliope sp.; 1948—July 24 (1, 481357).

MICROPEZIDAE.

Scipopus sp.; 1948—June 6 (1, 48697).

MYCETOPHILIDAE.

Mycetophila sp.; 1948—July 24 (1, 481379).

ORTALIDAE.

Acrosticta sp.; 1948—(2, 481348, 481352).

Euxista sp.; 1948—(1, 481350).

PYRGOTIDAE.

Genus ?; 1946—April 28 (1, 46428; flurry of about 20 passing).

RHAGIONIDAE.

Chrysophilus sp.; 1948—July 24 (1, 481127A).

SAPROMYZIDAE.

Minettia sp.; 1948—July 24 (1, 481343).

Pseudogyrophoneura sp.; 1948—July 24 (1, 481344).

STRATIOMYIDAE.

Aloipha sp.; 1948—July 24 (1, 481320).

Anatella sp.; 1948—June 21 (1, 48869; many flying south, 6 taken in one net).

Merosargus sp.; 1948—July 24 (1, 481347).

Spaniomysia pulchripennis Br.; 1948—May 21 (1, 481308).

SYRPHIDAE.

Baccha clavata Fab.; 1948—June 22 (1, 48877; hundreds).

Baccha dimidiata Fab.; 1948—July 20 (1, 481267; many seen).

TACHNIIDAE.

Tachniid genus?; 1948—July 24 (1, 481356).

Rhynchiodexia sp.; 1948—June 22 (1, 48876; several hundred alighting and flying).

THEREVIDAE.

Psilocephala sp.; 1946—May 14 (1, 461238).

TIPULIDAE.

Erioptera beebeana Alex.; 1948—July 25 (1, 481374A).

Erioptera celestis Alex.; 1948—July 25 (1, 481374B).

Limonia angustifasciata Alex.; 1948—May 23 (1, 481457A; see note under *Tipula lichyana*); July 21 (1, 481275; many flying past).

Neognophomyia monophora Alex.; 1948—July 25 (1, 481374C).

Paradelphomyia venezolana Alex.; 1948—July 25 (1, 481374D).

Shannonomyia araguae Alex.; 1948—July 25 (1, 481374E).

Shannonomyia providens Alex.; 1948—July 22 (1, 481365; numbers of this species (?) passing).

Tipula lichyana Alex.; 1948—May 23 (1, 48569; two species in great numbers on leaves, caught in spider webs, and passing south); June 14 (1, 481457).

HYMENOPTERA.

Together with the migrants of thirteen other orders, no fewer than fifteen families of Hymenoptera came zooming through Portachuelo Pass. Many appeared in enormous numbers; ichneumonids so small and delicate that they often became visible only in full sunlight; giant pompilids and scoliids followed one another in unending files, day after day; uncounted thousands of yellow-jackets, and bees, from euglossids of largest size, down to tiny trigonids. In numbers and in the loud humming of wings, Hymenoptera formed a very appreciable percentage of the insect horde pouring across the summit of the pass, always from north to south. Only a relatively few Hymenoptera have been identified. To give hints of prominent field characters I have added names from my journal.

TENTHREDINIDAE.

Tenthredinid genus and species? Two specimens of sawflies were taken; 1948—May 26 (1, 48632); June 20 (1, 481603).

ICHNEUMONIDAE.

Near *Ophion*; A small (12 mm.) slender form was a very abundant migrant. A note made on June 22 will serve as a sample of

our observations. "Beginning at 7:30 A.M. these very small ichneumonids appeared in large numbers, as they have throughout the whole of the month. They fly low and rather slowly, and a single sweep of the net sometimes captured from 3 to 15 of these insects. We must have taken hundreds inadvertently, and liberated them." 1948—May 20 (1, 48536); June 7 (1, 48772; 6 others in net), 22 (3, 48871), 29 (1, 48995); July 15 (2, 481175, 481176).

Near *Rhyssa*; 1948—June 5 (1, 48693; 12 others seen; ovipositor 65 mm. in length).

Various ichneumonids; 1948—April 30 (1, 48471); May 20 (1, 48533; dozens flying and resting on leaves), 20 (1, 48534; 4 others in net), 26 (1, 481417; several hundred alighting and flying), 26 (1, 48634), 25 (1, 48591), 27 (1, 48638); June 6 (1, 48695), 6 (1, 48396), 6 (1, 48704), 6 (1, 48706), 6 (1, 48718), 15 (1, 48803), 19 (1, 48857; 2 others in net, 6 on leaves), 24 (1, 48911), 30 (2, 481007; 3 in net); July 2 (2, 481313, 481314).

PELECINIDAE.

These were occasionally seen among the migrants, the females being especially easy to identify on the wing and to catch. Several were often in sight at once, on their way south. Six were taken, of which one was a male. 1946—March 5 (1). 1948—June 19 (1 male, 48856; several more seen), 23 (1, 48893; 4 resting under leaves, 12 passing slowly), 24 (1, taken; 6 under leaves, 18 others flying slowly), 25 (6 seen); July 6 (1 taken, 4 seen), 8 (3 seen), 13 (1, 481157A), 14 (1, 2 seen), 15 (1, 481188).

CYNIPIDAE.

Four individuals of these gall-making Hymenoptera were taken when flying through the pass. On July 4 they were in such numbers and exhibited such persistently southward flight as to ensure their inclusion in the category of true migrants. 1948—July 5 (4 in one sweep of the net; 28 others counted crawling about on leaves, on my hands, and occasionally taking to wing and joining the quantities of small migrants passing at the time), 16 (1, 481210).

POMPILIDAE.

These large insects were conspicuous migrants, and from first to last, many hundred were seen. They usually passed singly, high or low, according to the weather, with direct flight. Many, however, stopped to rest on leaves, especially in stress of fog or wind, to preen for a while and then to continue. They passed along two favorite routes, definitely through openings in the low shrubs, and day after day they could be accurately clocked. In their case, as in many other insects, there was a remarkable segregation of species. If several specimens of the orange-antennae *Pepsis* were taken, the succeeding passing individuals were more than likely to be of the same species.

Pepsis spp. Tarantula wasps; 1948—June 5 (1, 48723; 9 on leaves and flying. Later, counted 14 singly. The orange antennae were conspicuous in the sunlight), 6 (1, 48722, three inch spread; 15 flying singly; not a single orange-antennae), 7 (1, 48765; 9 seen); July 3 (another flight of the orange-antennae; counted 42, many forced to alight), 4 (4 more orange-antennae seen), 9 (1, 481132; 32 *Pepsis*, uncertain species, flying high and fast), 10 (1, 481141; 3 others seen, unknown species), 21 (1, 481279; 28 counted).

Various pompilids:

Golden-wing; 1948—March 28 (1, 481-418); May 30 (1, 48679).

White-shouldered; 1948—June 28 (1, 48979).

Half-amber-antennae; 1948—July 3 (1, 481034).

Amber-antennae, Small Greenwing; 1948—July 10 (1, 481139; 4 others seen).

Amber-antennae Small Brownwing; 1948—July 23 (1, 481034).

Opalwing; 1948—July 13 (1, 481139).

SCOLIIDAE.

Several species of scoliids are included in the following list of migrants. For convenience in the field I provided common names as well as individual catalogue numbers. Complete taxonomic identifications will have to be postponed.

Several species were observed in considerable numbers, usually flying singly through one of two narrow, open lanes at the top of the pass. In strong wind the insects often alighted, affording good opportunities for confirming sight identification.

To emphasize absorption in the pull of migration I caught a scoliid, *Campsomeris ianthina*. I netted it at the pass in full flight, carried it two hundred feet out to the main road, swung it rapidly in the net, about fifty times, then liberated it. The insect crawled to the top of the net, preened for a few seconds, took to wing, flew twice in circles overhead, and set a straight course to the south.

Campsomeris ianthina Bradley; Giant Scoliids (75 mm. wing spread; 45 mm. length); 1948—March 28 (1, 481597); April 29 (1, 48434; 48 counted singly), 30 (1, 481419); June 5 (1, 48592; 9 seen), 6 (2, 48721), 19 (1, 48765), 21 (2, 481420, 481598); July 8 (1, 481125; 294 counted, mostly singly, or alighted in groups, during 3 hours. No other species).

Days of special abundance, June 17, 18 and 27.

Medium Scoliids (length 30 mm.); 1948—June 15 (6, 48681; 34 others counted; these have been passing for weeks); July 11 (89 counted), 29 (1, 481309). Days of unusual abundance, June 9, 10 and 28; July 4 and 11.

Small Amberwing Scoliids (length 23 mm.); 1948—June 11 (1, 481599), 22 (1, 48872; numbers passing. In sudden rain 8

in a group clutched the underside of a leaf. To this they clung tenaciously until carried almost to Rancho Grande, when they all left, took to wing, circled and flew off southward.), 24 (1, 48916; several others); July 16 (3, 481214, 481600, 481601).

Clear-winged Scoliids (length 35 mm.); 1948—June 24 (1, 48917), 22 (1, 48886).

FORMICIDAE.

This leaf-cutting ant is included in this list only because of two mass movements through the pass from north to south. These flights of the mature sexes of *Atta* did not originate in any local nest, and on both occasions the movement was against adverse conditions of wind. Local nuptial flights on other occasions, were diffuse and no individuals were seen flying with the migrants. (Compare with Isoptera). 1948—May 23 (2, 48571, male, 48571A, female); June 7 (1, 48766, male).

VESPIDAE.

A dozen species of Vespidae were taken and there must have been many other species which passed unseen or uncollected. Two or three species were among the most abundant of the daily migrants, hundreds passing day after day. On days of weather stress, the foliage would sometimes be covered with one or both of the following species.

Stelopolybia areata Say. Yellow-jackets; 1948—June 6 (1, 48709), 15 (235 counted, passing steadily), 17 (Hundreds, all morning), 18 (Steady stream), 19 (2, 48802; 150 in 2 hours), 28 (Hundreds fighting wind); July 5 (Hundreds, as during past weeks), 7 (2, 481108), 16 (2, 481208; Greatest numbers yet, thousands).

Gymnopolybia panamensis Cam. Black Wasp; Another very abundant migrant throughout June and July, usually singly, occasionally in small swarms. Almost no day without taking or seeing them. They frequently alighted on leaves at the pass. 1948—June 7 (1, 48769; several small swarms), 15 (1, 48804; 7 on leaves, fifty-odd circling or flying directly south), 24 (3, 48912, 48913, 48914; many singly); July 3 (1, 481037; 3 others caught at once), 5 (1, 481086), 7 (2, 481311, 481312), 29 (1, 481437).

Polybia liliacea F. Orange-figured-thorax Wasp; 1948—July 16 (1, 481217). Taken on five other occasions.

Large Buff-band-winged Hornet; 1948—July 2 (1, 481310), 16 (3, 481207; 4 others seen singly), 17 (1).

Hieroglyphic Hornet; 1946—March 5 (2, 46216; 21 others counted flying slowly around pass before heading south). 1948—May 5 (1, 48570; 42 others driven by high wind, down to bushes).

Various Vespidae; 1946—August 31 (1, 46995). 1948—June 6 (1, 48702); July 9 (1, 481133; 9 others taken in the same sweep of the net), 16 (1, 481209), 16 (1, 481213).

APOIDEA.

Some twenty species of this superfamily were taken migrating through the pass. Several were very numerous, but none abundant. At no time, throughout many observations scattered over two years, did I record a single bee returning northward through the pass. Yet many of the euglossids and other bees were carrying loads of fresh or dried pollen. This is another of the many confusing problems presented by this mass emigration. For the nomenclature of the superfamily Apoidea I have to thank Dr. Herbert F. Schwarz.

ANTHROPHORIDAE.

Chalepogenus xanthapis Cockerell. 1948—June 6 (1, 48703, female), 22 (1, 48874, female).

Epicharis rustica (Olivier). 1948—July 16 (1, 481215A, female).

Hemisia denudans. 1948—June 19 (1, 48760, female; about 30 passed in two hours).

Hemisia labrosa Friese. 1948—June 19 (1, 48862; several others caught in same net).

Hemisia sp. 1948—June 19 (1, 48852).

APIDAE.

Apis mellifera Linn. 1948—July 16 (3, 481205). Honeybees were abundant on the summit of the pass on this date, fighting the high wind. Although they were headed southwards this must have been due to the meteorological conditions, and cannot be recognized as an isolated example of migration.

BOMBIDAE.

Bombus niger Franklin. 1946—May 10 (1, 461239; taken on many other occasions). 1948—June 22 (1, 48875; taken singly on many days); July 3 (1, 481047).

Bombus robustus Smith. 1948—July 18 (1, 481249).

Bombus volucelloides Gribodo. 1948—July 5 (1, 481071), 13 (1, 481415). Taken several times; appears to be a common migrant.

COLLETIDAE.

Colletes sp. 1948—July 4 (1, 481060, female).

Ptiloglossa mayarum Cockerell. 1948—March 13 (1, 481416).

EUGLOSSIDAE.

Aglae caerulea Lepeletier. 1948—July 17 (1, 481242; not uncommon, flying singly through the pass).

Euglossa boliviensis Friese. 1948—June 19 (1, 48850; many seen passing).

Euglossa buchwaldi Friese. 1948—July 16 (1, 481215).

Euglossa dimidiata (Fabr.). 1948—June 19 (1, 48851; others seen); July 7 (1, 481106, male).

Euglossa dimidiata, var. *flavescens* Friese. 1948—March 26 (1, male); June 7 (1, 48762; 18 others seen).

Euglossa fasciata Lepel. 1946—April 30 (1, 46407). 1948—July 16 (1, 481216, female).

Euglossa magretti Friese. 1946—September 1 (1, 461110, male).

Euglossa smaragdina Perty. 1948—June 7 (1, 48763; plus 26 seen), 12 (1, 48789), 19 (1, 48849; a common migrant).

Euglossa viridissima Friese. 1946—May 8 (1, 461240, female).

Euglossa sp. 1946—July 23 (1, 461241).

Exaerte frontalis (Guérin). 1946—May 9 (1, 461099).

MEGACHILIDAE.

Megachile colombiana Mitchell. 1946—June 22 (1, 461242).

MELIPONIDAE.

Melipona fasciata indecisa Cockerell. 1946—March 6 (1, 461243). 1948—June 26 (1, 48965).

Melipona fasciata var. 1946—May 11 (1, 461244). ("Virgin queen. This is possibly the undescribed queen of *indecisa*." Herbert F. Schwarz).

Trigona amalthaea (Olivier). 1946—May 27 (1, 461245).

Trigona fulviventris Guérin. 1946—February 26 (1), March 7 (1), March 13 (1), March 16 (2), May 29 (1),; June 20 (1). 1948—June 24 (1, 48915; many resting on leaves); July 2 (1, 481316), July 16 (1, 481212).

Trigona testacea cupira Smith. 1946—May 7 (2, 461246).

Trigona trinidadensis Provancher. 1948—June 6 (1, 48698), 6 (1, 48701, male), 15 (1, 48799); July 16 (1, 481211).

XYLOCOPIDAE.

Xylocopa brasilianarum Linn. 1948—June 19 (1, 48853, male; 25 others seen).

Xylocopa frontalis trinitatis Cockerell. 1948—July 7 (1, 481105, female; not rare).